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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.       | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------------|------------------|
| 10/721,751   | 11/26/2003  | Akihiko Shiina       | K06-163744M/TBS           | 3940             |
| 21254  | 7590        | 12/27/2005           | EXAMINER                  |                  |
| MCGINN INTELLECTUAL PROPERTY LAW GROUP, PLLC<br>8321 OLD COURTHOUSE ROAD<br>SUITE 200<br>VIENNA, VA 22182-3817 |             |                      | LUM VANNUCCI, LEE SIN YEE |                  |
|  |             |                      | ART UNIT                  | PAPER NUMBER     |
|  |             |                      | 3611                      |                  |

DATE MAILED: 12/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                                      |                                      |  |
|------------------------------|--------------------------------------|--------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/721,751 | <b>Applicant(s)</b><br>SHIINA ET AL. |  |
|                              | <b>Examiner</b><br>Lee Lum           | <b>Art Unit</b><br>3611              |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 08 December 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-10, 12-18 and 20-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) all is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

1. An Amendment After-Final was filed 12/8/05, and will be entered into the application. Claim 16 was also cancelled. The Claims presented for examination are 1, 3-10, 12-15 and 17-32.

Upon reconsideration, Examiner provides new rejections as follows, and *sincerely apologizes for the inconvenience*.

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

**Claims 1, 3-10, 12-15, 17-32** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Claims contain vague language that prevents comprehension of the invention and its structure, as follows.

According to Merriam-Webster's Collegiate Dictionary, 10<sup>th</sup> Ed., the definition of "backlash" is

"a sudden violent backward movement or reaction", "the play between adjacent movable parts (as in a series of gears) ; the jar caused by this when the parts are put into action".

The following issues exist with respect to "backlash".

In Claim 1, "wherein at least one of said driven, and driving gears, comprises a bias portion that sets said backlash" is unclear because it is unknown how backlash can be "set". According to the definition above, backlash (naturally) occurs between gears, and appears to have a large random component because the amount of reaction/jarring is inexact. Therefore, it is unclear how it can be "set".

In Claim 2, it is unclear how backlash is *necessarily* decreased by "biasing a part of an outer periphery of teeth".

In Claims 8, 12 and 20, it is unclear how backlash is "smaller" in one region as compared to another region.

In Claims 10 and 31, it is unclear how backlash changes "gradually between the first and second regions of operation".

In Claim 16, it is unclear how a "bias portion" necessarily causes a "correspondence to a first range of operation".

In Claim 20, the "first/second range of operation" is so unclear/vague such that it is unclear what comprises the invention.

NOTE: Specificity as to the invention's structure may also aid in resolving these issues, and thus increase comprehension of the invention.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**As best understood, Claims 1, 3, 4, 7, 10, 21, 22 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Appleyard 6491131.**

*As best understood*, Appleyard discloses an electric power steering apparatus (fig 1) comprising

Driving gear/worm 13, and driven gear/worm wheel 12,

In which backlash between the two is set at least in a neighborhood region (or, first range of operation) of a steering neutral position region (c1, In 60-66; "driving straight ahead") as smaller than in a remaining region (or, second range of operation) (i.e., outside the "predetermined range of torque values"),

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Wherein the driving gear comprises bias portion 14 that sets the backlash (c6, In 39-40, 50-52, 59-65), *as best understood*, and that corresponds to the first range of operation (c6, In 59-63; "in order to prevent gear rattle when driving around the straight ahead"),

and further,

The neighborhood region comprises a steering angular range on each side of the steering neutral position, as provided in c1, In 60-66; "over a predetermined range of torque values...[so] preventing gear rattle when driving straight ahead",

wherein the remaining region comprises a steering angle that exceeds the steering angular range (c1, In 60-66, because this region is outside the "predetermined range of torque values...when driving straight ahead"),

Wherein a shaft center of the worm is offset from the worm wheel in an axial direction, via (at least) element 14, and,

The backlash changes gradually between the regions (inherent because the gears are fit, and adjusted, such as by elements 8,9,14, such that backlash is minimized; i.e., the gears correspond closely such that steering is generally smooth between "regions" of operation), *as best understood*.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

A. ***As best understood***, Claims 5, 6, 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Appleyard.

*As best understood*, re **Claims 5 and 27**, Appleyard does not disclose the steering angular range as comprising a substantially equal steering angle on each side of the neutral position. However, this feature would have been obvious in order to provide a steering transition between each side of the neutral position that is generally equally smooth between areas of operation, thus increase driver comfort.

*As best understood*, re **Claims 6 and 28**, the reference does not disclose the steering angle as comprising about 20 degrees of steering angle, but this feature is clearly application-dependent. The particular angle would be predetermined to achieve desired steering/handling characteristics. In this manner, it would have been obvious to one with ordinary skill in the art at the time the invention was made to include an appropriate steering angle to achieve certain desired steering characteristics.

**B. As best understood, Claims 2, 12-15, 17, 18, 20, 23-28 and 31** are rejected under 35 U.S.C. 103(a) as being unpatentable over Appleyard in view of Higuchi 4475413.

*As best understood*, re **Claims 2, 12 and 20**, Appleyard discloses the elements as provided above, but does not disclose a bias portion on the outer periphery of teeth, *as best understood*. In figs 4, Higuchi shows a bias portion (wider top portion) on tooth 10c, as compared to the other teeth. It would have been obvious to one with ordinary skill in the art at the time the invention was made to include this configuration, as shown in Higuchi, to affect the manner in which the gear connects with the other gear, *as best understood*.

*As best understood*, re **Claims 13-15 and 23-25**, Appleyard discloses the elements as provided above, but does not disclose either gear as including a first radius of a pitch circle corresponding to a range of operation that is larger than a second radius corresponding to a remaining region. Higuchi shows this configuration in fig 2 with

Driving gear 10 having teeth 10a-10f with different pitch circles with respective correspondance, and as disclosed in c3, ln 14-39.

It would have been obvious to one with ordinary skill in the art at the time the invention was made to include this feature, as shown in Higuchi, to provide certain steering characteristics for a particular application.

*As best understood*, re **Claims 17, 18, 26-28 and 31**, Appleyard discloses the recited elements as previously provided.

**C. Claim 32** is rejected under 35 U.S.C. 103(a) as being unpatentable over Appleyard in view of Higuchi, and in further view of Kojo et al 6041887.

The previous references disclose the elements as provided above, but do not disclose a motor with variable power assist.

Kojo shows motor 24 as controlled to output variable power assist, according to the range of operation (i.e., of the steering wheel), as provided in c5, ln 24-34, ln 52-56, c6, ln 53-63, etc). It would have been obvious to one with ordinary skill in the art at the time the invention was made to include this feature, as shown in Kojo, to provide improved steering handling, thus increase driver comfort. This feature is well-known for this objective.

5. *As best understood*, the portions of **Claims 8, 9, 29 and 30** concerning an equation involving gear interaction and/or relationships are not disclosed in prior art.

6. RESPONSE TO REMARKS

Examiner provides new rejections, including 112/2<sup>nd</sup>, and again *sincerely apologizes for the inconvenience*. Insufficient specificity re the structure of the gears with respect to backlash (as understood to be the crux of the invention) severely affects comprehension of the invention. Therefore, Appleyard in view of Higuchi, etc., arguably obviates the recited elements.


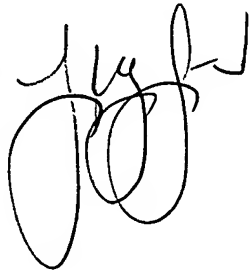
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7. Communication with USPTO/Examiner

Any inquiry concerning this communication, or others, should be directed to Ms. Lum at 571 272-6649, M-F, 9-5. If attempts to reach the examiner are unsuccessful, her supervisor, Ms. Lesley Morris is at 571 272-6651. Our fax number is 571 273 8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for unpublished applications: private PAIR only, for published applications: private or public PAIR. For more information re PAIR: <http://pair-direct.uspto.gov>. Questions re access to the Private PAIR system should be directed to the Electronic Business Center (EBC) at 866 217-9197 (toll-free).

Ms. Lee S. Lum-Vannucci  
Examiner  
12/19/05



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